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INTEGRATED BUSINESS PLANNING CLOUD SYSTEM IN THE MEDICAL ORGANIZATION

Saida Dospan[1] ✉, Anastasia Khrykova[1], Manfred Esser[2]

[1] Peter the Great St. Petersburg Polytechnic University, Saint Petersburg, Russia;
[2] GetIT, Germany

✉ dospan88@mail.ru

Abstract. Every medical entity is complex and consists of many divisions which should be properly connected through information systems. One of the main fields for constantly improving in the healthcare institution is supply chain and inventory management. The aim of this research is an analysis of the medical organization's main features and considering the Integrated Business Planning (IBP) concept as an efficient planning tool for the healthcare institution's supply chain. An enterprise architecture approach and the case study are defined as the main research methods. The medical institution's key stakeholders and information systems, inventory management's features, definitions of the IBP concept and main stages of implementing SAP IBP cloud system in the multifunctional medical center are considered in the research. SAP IBP cloud system is a real-time planning solution which will allow the medical institutions to optimize inventory management and supply chain. A comparative analysis of ERP and IBP systems, the case studies regarding implementing IBP system in the healthcare sector are the keyways for further research in this field.

Keywords: the healthcare sector, the medical institution, enterprise resource planning, inventory management, integrated business planning, SAP Integrated Business Planning cloud system

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КОМПЛЕКСНАЯ ОБЛАЧНАЯ СИСТЕМА БИЗНЕС-ПЛАНИРОВАНИЯ В МЕДИЦИНСКОЙ ОРГАНИЗАЦИИ

Саида Доспан[1] ✉, Анастасия Хрыкова[1], Манфред Эссер[2]

[1] Санкт-Петербургский политехнический университет Петра Великого, Санкт-Петербург, Россия;
[2] GetIt, Германия

✉ dospan88@mail.ru

Аннотация. Любая медицинская организация сложна и состоит из множества подразделений, которые должны быть надлежащим образом связаны между собой информационными системами. Одним из основных направлений постоянного совершенствования в медицинском учреждении является управление цепочками поставок и запасами. Целью данного исследования является анализ основных особенностей медицинской организации и рассмотрение концепции интегрированного бизнес-планирования (ИБП) как эффективного инструмента планирования цепочки поставок медицинского учреждения. В качестве основных методов исследования определены подход к архитектуре предприятия и тематическое исследование. В исследовании рассмотрены ключевые заинтересованные стороны и информационные системы медицинского учреждения, особенности управления запасами, определения концепции ИБП и основные этапы внедрения облачной системы SAP ИБП в многофункциональном медицинском центре. Облачная система SAP IBP — это решение для планирования в режиме реального времени, которое позволит медицинским учреждениям оптимизировать управление запасами и цепочкой поставок. Сравнительный анализ систем ERP и IBP, тематические исследования по внедрению системы IBP в сфере здравоохранения являются ключевыми направлениями дальнейших исследований в этой области.

Ключевые слова: сектор здравоохранения, медицинское учреждение, планирование ресурсов предприятия, управление запасами, интегрированное бизнес-планирование, облачная система SAP Integrated Business Planning

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Introduction

The key purpose of the healthcare sector is continuous maintenance of health through the prevention, diagnosis and treatment of diseases, physical and mental disabilities in human beings (Arora and Gigras, 2018). Healthcare institutions are complex, multi-functional, information intensive organizations that require sophisticated integrated clinical and business management information systems. This integration was hardly achieved by the information systems used by hospitals throughout the 1980s and in most of the 1990s. However, the emergence of the enterprise resource planning (ERP) software radically transformed the computing platform of most organizations, including hospitals (Stefanou and Revanoglou, 2006).

Although integration success in ERP implementations is questionable, ERP systems functionality and integration greatly improved over the last decade by incorporating specific industry solutions. For

example, the Hospital Industry Solution developed by SAP (IS-H), designed to integrate the clinical, financial, and administrative functions, provided an incentive for hospitals worldwide to implement SAP's R/3 ERP software (Stefanou and Revanoglou, 2006).

Nowadays digitalization of the healthcare sector is continued worldwide. This process was even more accelerated by COVID-19 pandemic. According to the CB Insights, in 2020 investments in digital medicine was 45 % higher compared to the previous 2019 year. The number of investments in the healthtech industry in the world was equal to $26,5 billion (Moro Visconti and Morea, 2020).

The article focuses on the role of the Integrated Business Planning in healthcare (ant its automation) as an approach for effective planning and management of the healthcare organization resources.

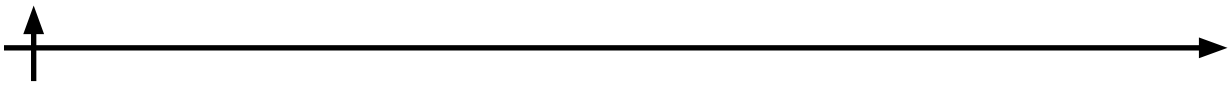
Literature Review

Complexity of the healthcare institution in terms of information objects and interacting different divisions are illustrated by (Domain reference model for hospitals version 2, 2012). This domain reference model for hospitals was developed and presented in 2012 by Netherlands Association of Hospitals and National IT Institute for Healthcare in the Netherlands for supporting the organization of information technology in Dutch hospitals.

Advantages of implementing ERP system in a healthcare organization in terms of operations (ERP enables to reduce costs and cycle time), finance (it can help to identify solutions to cut costs, improve managerial reports, reduce risks and anticipate results), IT infrastructure (build business flexibility for current and future changes in the organization, IT costs reduction and increased IT infrastructure capability), central database (every business unit will have access to the information readily available when needed) and its disadvantages (ERP systems may have too many features and modules that users need to consider; expensive implementation and maintenance; dependence on the ERP vendor; organizations using ERP systems risk breaks in their services when their ERP systems break down, thereby causing interruptions in various services) were summarized by (Mucheleka and Halonen, 2015).

A case study about integrated Computerized Order Entry (COE) system implemented in Papageorgiou Regional General Hospital in Greece utilizing SAP R/3 software was described and evaluated by (Stefanou and Revanoglou, 2006). It was the first ever implementation of ERP software in a hospital in Greece which resulted in a number of considerable benefits: improvements in information quality, data integrity and procedures, visibility and timeliness of information, increasing quality of communication between nurses and the storage locations' personnel, common data definitions and procedures among departments, automated generation of the list of requirements resulting from clinic orders, decreasing transaction costs and complete and accurate billing procedures. As for difficulties, according to the authors, the two main sources of difficulty in implementing the process were the following: first, the existence of small warehouses of medical materials in some departments, which operated in addition to the main warehouse of the hospital. Secondly, the existence of different units of measurements of drug doses among ERP system's stakeholders (e.g. pharmacy and clinics). Although it is not very difficult to handle technically both issues, which had been implemented rather easily after all, the mere mention of them implies that some technical issues during requirements analysis may have been overlooked (Stefanou and Revanoglou, 2006).

In (Igor V. Ilin et al., 2020) a reference model of service-oriented IT architecture of a healthcare organization was given. According to (Igor V. Ilin et al., 2020), IT support of a medical organization includes following basic components of applications and their services: electronic medical record (including dental medical card); the system of providing outpatient care; the system of providing inpatient care; clinical monitoring system; anesthetic monitoring system; the accounting system; personnel management system; POS-system pharmacy; Laboratory Medical Information Systems. The leading concepts of the modern healthcare system such as value medicine, personalized medicine, the concept



of Health 4.0 were also explained by the authors.

A detailed analysis of IT and technological architecture of a healthcare organization based on the TOGAF architecture description standard was given by (I. V. Ilin et al., 2020). The presented reference model consists of the next main classes of systems for the medical institution: ERP, MIS, BI. The model also indicates the software of medical equipment and the equipment itself, including personal wearable devices. All these systems supported by technological elements and information exchange is established between them (I. V. Ilin et al., 2020).

As for research articles about supply chain and inventory management in the medical institution, supply chain in healthcare can be defined as the sequence of physical and technical resources required in order to deliver a good service to patients with complete satisfaction in a cost-optimized manner. Based on their functions, stakeholders in the healthcare supply chain can be divided into four groups: manufacturers, purchasers, distributors, and providers (Arora and Gigras, 2018). Different aspects of hospital as medical strategies and service excellence, patient reception & admission, diagnosis and patient treatment, medical record maintenance, patient discharge and rehabilitation services are considered for need of supply chain management by the authors. Hospital management had been categorized in following categories as check-in patients details (vital patient information), inventory control, billing and collection department, medical records, information system (staff, patient), patient information safety. Key objectives and functions of pharmacy supply chain, blood bank supply chain and patient safety supply chain were also characterized by (Arora and Gigras, 2018).

In (Leaven et al., 2017) the authors discussed inventory management applications for healthcare supply chain under seven specific themes: 1) recent trends, issues, and solutions to inventory management from a logistics perspective; 2) pharmaceutical supply chain inventory management; 3) perishable inventory management in the healthcare sector; 4) influence of conflicting goals among stakeholders on managerial decision making; 5) new trends in the health care supply chain (VMI - Vendor Managed Inventory, RFID - Radio Frequency Identification technologies, the centralization of Hospital Inventory); 6) outsourcing, which is another cost savings tool used in the health care supply chain; 7) inventory rotation systems, which utilize the perishable medical supplies before they pass their expiration date to reduce the amount of waste incurred in healthcare facilities (Leaven et al., 2017).

As for future research in this field, the following themes were defined by the authors: the effect of demand uncertainties on workloads; outsourcing vs. in-house distribution network; trade-off between the predetermined service level throughout the entire system as well as the predetermined service level at the department level; the trade-offs between the desired target inventory levels for warehouses based on incremental echelon cost and the desired target inventory levels which are based only on installation cost (Leaven et al., 2017).

Overall, IBP concept and implementing IBP systems in the medical institution are new topics in research. Basic ideas of IBP concept were considered, for instance, in the following research works: in (Luoma, 2021) the author studied how the implementation of the concept affects inventory management related processes in the case company that operates in telecommunication and security industry, a detailed description of SAP IBP cloud system was given by (Kepczynski et al., 2018a).

The aim of this research is an analysis of the medical organization's features and considering the Integrated Business Planning (IBP) concept as an efficient planning tool for the healthcare institution's supply chain. In order to achieve this goal, the following tasks were defined: determination of the research main materials and methods; an analysis of the medical institution's key stakeholders and information systems; specification of inventory management's features in the healthcare sector; definition of the IBP concept and main stages of implementing SAP IBP cloud system in the multifunctional medical

center; formulation of the further research directions in this field.

Materials and Methods

The methodological basis of the research is an enterprise architecture approach which can be defined as an overarching plan describing organizations from the integrated business and IT viewpoints. Enterprise architecture takes a holistic perspective and shows the relationship between business goals, strategies and processes, and IT capabilities, systems, and technologies (Kotusev, 2017). Nowadays there are several basic standards and methods for building enterprise architecture, but only one of them contains an architectural design method that answers the question of "how?". That standard is TOGAF, The Open Group Architecture Framework, developed by The Open Group consortium. At the core of TOGAF is the Architectural Development Method (ADM), which describes a step-by-step cyclical approach to developing an overall enterprise architecture (I. V. Ilin et al., 2020).

The second main approach which was applied in order to achieve the research's results is the case study of the multifunctional medical center. Implementing SAP IBP cloud system in the healthcare organization was illustrated based on AS IS model of this medical institution.

Results and Discussion

1. The medical institution: key stakeholders and complexity, inventory management's features and Integrated Business Planning (IBP) implementation

1.1. The medical institution's key stakeholders and complexity

Any medical organization, as was considered in the introduction part, is a complex, multi-functional and information intensive institution, which consists of different stakeholders (Table 1).

Table 1. Key stakeholders (in alphabetical order) and their main concerns (Tummers et al., 2021)

	Role	Concerns
1	Administrative staff	Wants easy data entering and retrieval
2	Automated data source	A protocol to safely upload data from heart rate monitor, wearable technology, medical robots, etc.
3	Care professional	Wants system to be easy to use such that information can be quickly entered, retrieved, and shared
4	Government	Wants the system to comply with all their regulatory standards
5	Healthcare manager	Needs system to provide overviews and reports
6	HIS (healthcare information system) developer	Develops system in time within the planned budget
7	Insurance company	Wants compatibility with their system for reimbursement
8	Laboratory	Wants compatibility with their measurement devices
9	Other HIS	Needs to be able to communicate with HIS and exchange data
10	Patient and/or representative	Wants data to be stored safe and secure. Wants care professionals to have the right information at the right time. Wants reimbursement of care
11	Pharmacist	Needs medication management to be an integral part of the system
12	Plug-in developer	Wants easy to use platform for plug-in development
13	Research institute	Needs system to provide structured data such that it can be used for research
14	Secretary	Needs system for making appointments and administrative tasks
15	HIS administrator	Wants system that is easy to maintain and adequately documented

A list of key stakeholders can vary considering type and specialization of the medical organization. One of the main purposes of HIS (healthcare information system) or MIS (medical information system) is providing continuous interaction between stakeholders.

Complexity of the healthcare institute in terms of information objects and interacting different divisions is illustrated by (Domain reference model for hospitals version 2, 2012) on the Figure 1. This domain reference model for hospitals was developed and presented in 2012 by Netherlands Association of Hospitals and National IT Institute for Healthcare in the Netherlands for supporting the organization of information technology in Dutch hospitals.

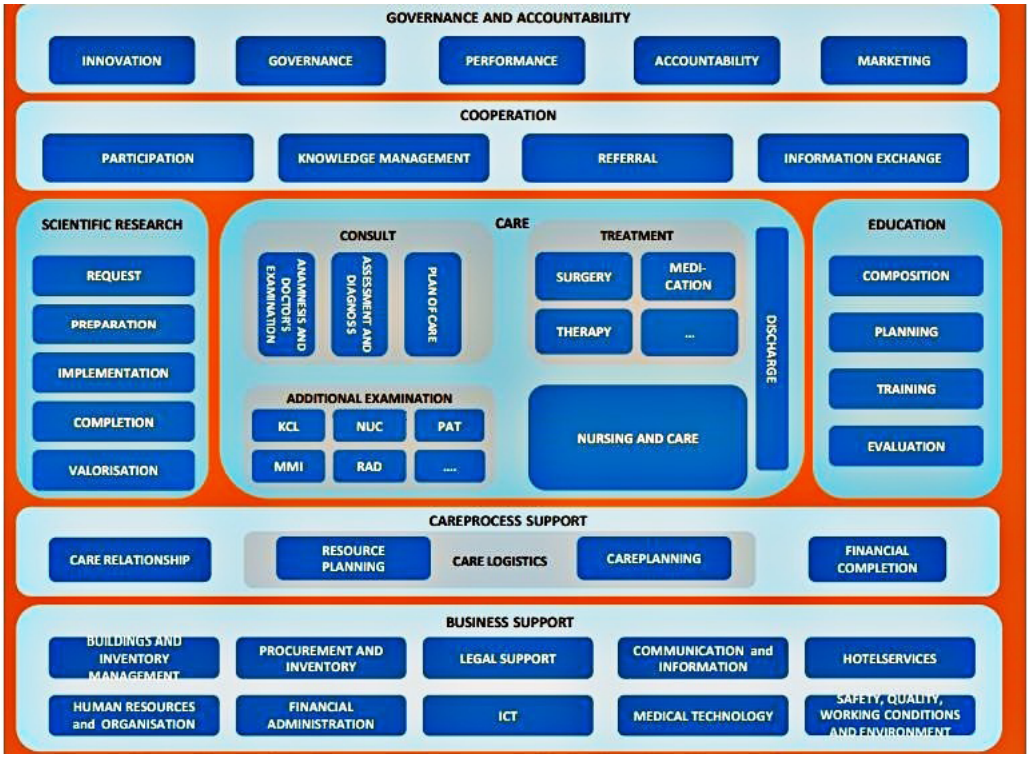


Fig. 1. Domain reference model for hospitals (Domain reference model for hospitals version 2, 2012)

Looking into details, the given domain reference model consists of governance and accountability domain, which includes the domains of governance, performance, accountability, marketing, and innovation. It includes not only the strategic governance and accountability from senior management, but also the governance and accountability at the tactical and operational levels. Cooperation contains the domains of participation, referral, knowledge management and information exchange. A core domain part of the model is care, which consists of key processes in hospitals: medical consultations, additional examination, treatment, nursing, and care. These processes should be supported by care relationship, resource planning, care logistics, care planning and financial completion. Scientific research and staff education are also an important part of any healthcare institute, which should be supported by legal support human resources and organization, financial administration, procurement, and inventory and etc. (Domain reference model for hospitals version 2, 2012).

1.2. Inventory management for the medical institution's supply chain

One of the crucial domains in any medical institute is inventory management which is responsible for coordinating the purchase and maintenance of instruments, keeping track of the expiry period and reorder status, finding economical suppliers (Mucheleka and Halonen, 2015; Stefanou and Revanoglou, 2006). The inventory management is an important function of the supply chain system in a hospital

since it can affect its current activity (Nabais, 2010).

The satisfaction of the clinical needs of a hospital requires the existence of stocked drugs and other materials. Inpatients have a need for medication; doctors use gloves, masks, and tools whenever surgery is carried out; likewise, hospitals also provide specific medicines for external patients, such as those used to treat diseases like AIDS and cancer, which are not supplied in retail pharmacies. These are just a few examples of the hundreds of activities performed in a hospital (Maestre et al., 2018). To a certain extent, some of these activities are foreseeable. For example, many surgeries are programmed weeks in advance. Others, however, are as unpredictable as accidents and heart attacks. Given the critical nature of the activities performed in a hospital, a certain number of stocked drugs and materials is necessary to avoid shortages that may have fatal consequences. Hence, inventory management is one of the most important activities carried out in the pharmacy department of a hospital. However, due to the high prices of some of these medicines, whose cost can scale up to hundreds or thousands of euros per unit, this activity also has a substantial impact on the hospital's budget: approximately one-third of the hospital's expenses in goods and services are originated at the pharmacy department (Maestre et al., 2018).

The organizations need to keep stocks in the warehouse due to several reasons, being the most known the quick demand satisfaction, to avoid stock outs, to minimize the forecast demand fluctuations, or get quantity discounts. In the case of hospitals, many materials are essential to keep the health quality or even the life of patients. On the other hand, the over stock affects the competitive power of organizations, through the impact on product costs. Thus, an efficient inventory management can balance several costs in association to it (Nabais, 2010). Besides, hospitals should take in consideration the wide range of different products, being the clinical consumption materials of high financial importance. Hospitals maintain stocks of an uncountable number of products with a lot of references and suppliers for the same product. This is sometimes comprehensible, as hospitals cannot dispense of having materials to ensure the patient' lives. But this need to be reviewed, otherwise it does not allow reaching scale economies or better negotiations with suppliers. In addition, the clinical consumption materials are very heterogeneous, in volume, value, and number of suppliers; hence a specific inventory management for each group of items is necessary (Nabais, 2010).

A supply chain in healthcare can be defined as the sequence of physical and technical resources required to deliver a good service to patients with complete satisfaction in a cost-optimized manner (Arora and Gigras, 2018). Based on the function's stakeholders in the healthcare supply chain can be divided into four groups: Manufacturers, Purchasers, Distributors, and Providers (Figure 2). Logistics is involved in handling different operations: demand/supply management, Production control, Operation, Inventory management, Warehouse management, Distribution and Transportation management. Logistics is responsible for two functions, first is of Managing resources i.e., Capacity management (Wheelchair, Stretcher, Ambulance), Warehouse management (Medical Equipment, Devices, Drugs), And second is for Managing workflow i.e. Shipping, Routing (patient, wheelchair, stretcher, ambulance) (Arora and Gigras, 2018).

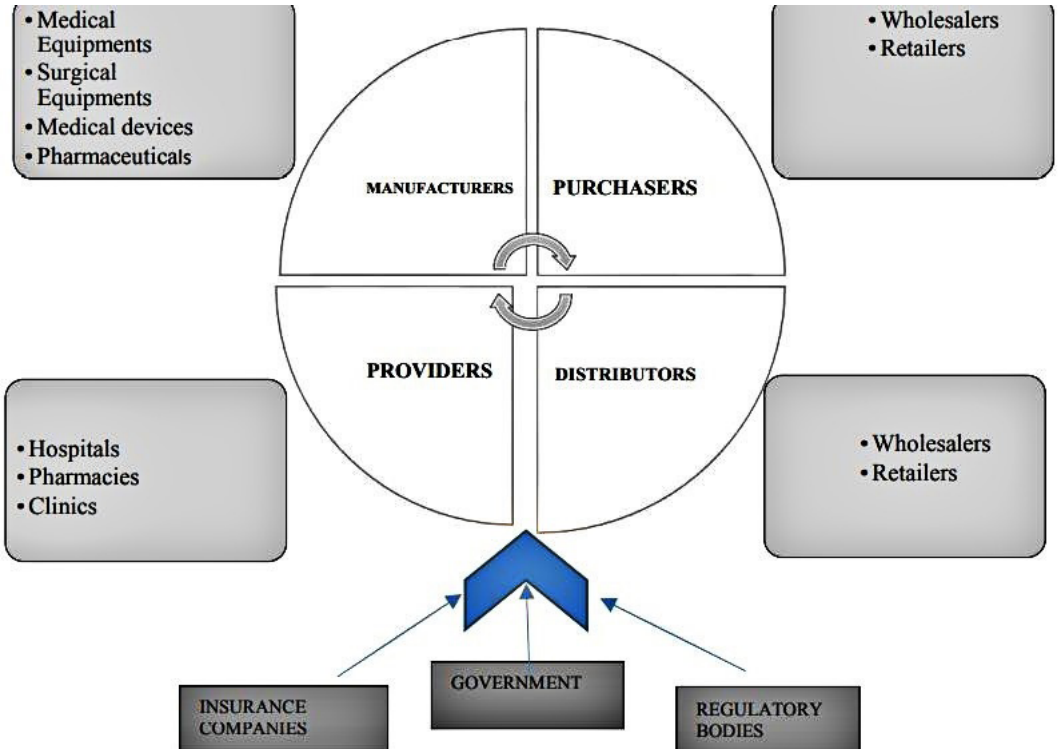


Fig. 2. Stakeholders of Healthcare system (Arora and Gigras, 2018)

1.3. Integrated Business Planning (IBP): definitions and SAP IBP applications overview

As one of the efficient tools for improving inventory management and supply chain management in the healthcare institute the Integrated Business Planning (IBP) concept can be considered. There are several definitions of IBP:

1. IBP is a management's planning tool that links a company's operations and strategy. It evolved from sales and operations planning (S&OP), which was not able to offer solutions to the multiple problems that companies are facing because of the lack of integration and structured cooperation between different business functions. The IBP process is led by senior management and gives them guidelines to execute a business strategy and make decisions proactively based on reliable supply and demand figures. It provides executives and management the ability to integrate business planning and forecasting. These will result in improved coordination in creating plans that are consistent with the corporate strategy. Managers can use IBP to leverage the company's information assets and use it evaluate activities based on the actual economic impact of each consideration. IBP covers the whole organization – not just one business function – in an integrated fashion and is more than anything about planning (Luoma, 2021).

2. IBP is a business management process which aims to connect strategic, tactical, and operational planning on local (market, sites), regional (incl. production sites), and global level, to assess risk and opportunities, to verify assumptions and to generate with cross-functional collaboration a feasible integrated business plan in volume and value (Kepczynski et al., 2018a).

The second definition was given in (Kepczynski et al., 2018a) by SAP employees in the context of description of implementing SAP IBP system which is a real-time supply chain planning solution purpose built to profitably meet future demand by optimizing the supply chain. Built natively on SAP HANA and deployed in cloud, SAP IBP provides the flexibility, agility, and performance to meet complex planning requirements of the next generation supply chain ("What is SAP HANA?," n.d.). SAP IBP is used by many customers in strategic, tactical, and operational planning on a unified integrated data model supporting sales and operation planning, demand planning, inventory optimization, response and supply, and control tower (Figure 3) (Kepczynski et al., 2018a).

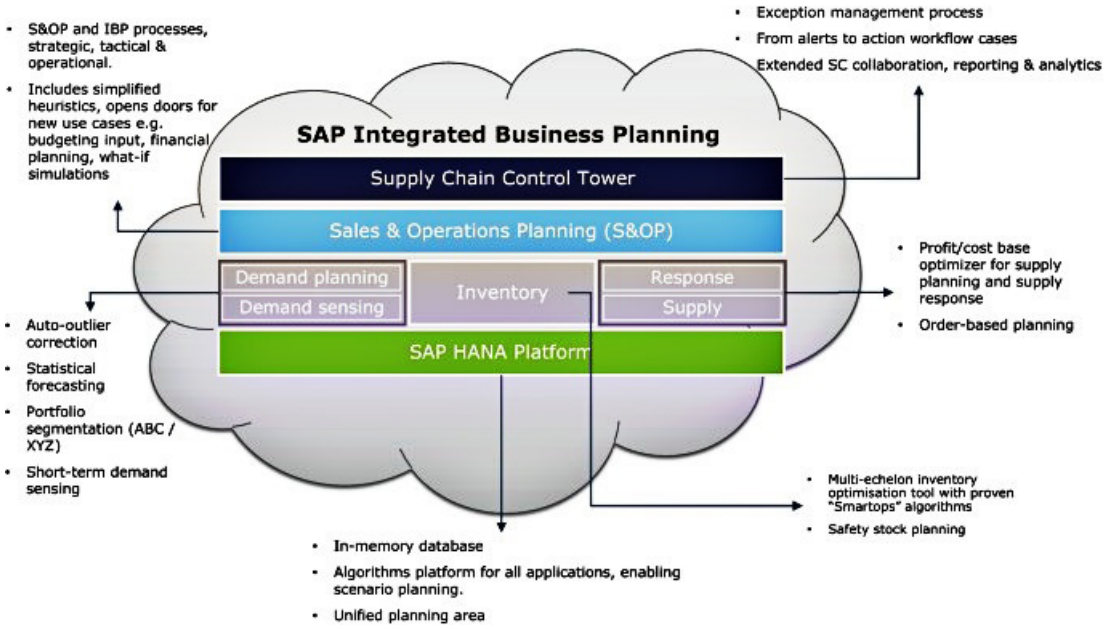


Fig. 3. SAP IBP applications overview (Kepczynski et al., 2018a)

Effectiveness of implementing SAP IBP system in the healthcare industry in Russia was proved by the company 'Nicamed' (Никамед) in 2021. This company is a representative on the market of medical orthopedic products in Russia. Implementing SAP IPB enabled the company to reduce actual stocks by 20% (by 500 million rubles on average) and improved the accuracy of planning and forecasting. They also managed to increase the SLA (service level indicator) by 1%, and the benefit from lost revenue amounted to 50 million rubles per month. SAP IBP cloud-based tools helped the company to organize the process of planning sales and purchases for 12 months, taking into account the target stock calculated by the system. A toolkit has appeared for monthly review, analysis and collegial approval of the sales and purchase plan, the ability to automatically calculate insurance and target stocks for each orthosalon. More than 60 reports have been developed for all groups and levels of planning. The sales and purchasing planning system is now linked to the company's annual budget plan (Kepczynski et al., 2018b).

2. Implementation of SAP IBP cloud system in the multifunctional medical center

2.1. IT and technological architecture of the multifunctional medical center

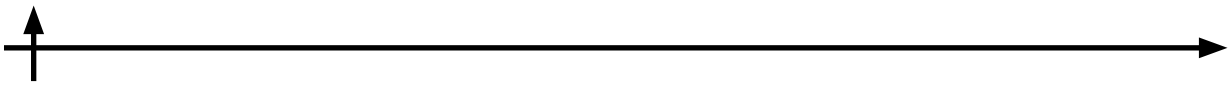
The IT and technological architecture of this multifunctional medical center was built on TOGAF, The Open Group Architecture Framework, developed by The Open Group consortium. At the core of TOGAF is the Architectural Development Method (ADM), which describes a step-by-step cyclical approach to developing an overall enterprise architecture (I. V. Ilin et al., 2020).

As a reference model for visualization of implementing SAP IPB cloud system the IT and technological architecture of the healthcare organization which was done by (I. V. Ilin et al., 2020) was chosen. This reference model was a little changed taking into account characteristics of the multifunctional medical center (Figure 4).

IT architecture of the considered medical center consists of the following systems:

1. ERP (enterprise resource planning);
2. MIS (medical information system);
3. Business intelligence system;
4. Medical equipment software.

Information is a crucial aspect of the healthcare sector. Year by year sharing well-prepared information and knowledge has become important in order to improve medical services and to reduce medical



organization's costs. As one of the efficient tools for achieving these goals implementing ERP (enterprise resource planning) system into IT architecture of a medical organization can be considered. This application can automate activities for personnel management, relationship with patients, procurement of medical equipment and consumables, logistics, and financial activities, as well as project management (I. V. Ilin et al., 2020).

As for MIS (medical information system), it is the most important application for medical organizations nowadays. MIS is a complex software product, the purpose of which is to automate all the main processes associated with the work of medical institutions of general and narrow specialization. Automated medical information systems allow you to establish electronic document flow quickly and efficiently, flexibly arrange work with patients, keep an operational record of the work of administrative personnel, etc. (Gusev, n.d.; I. V. Ilin et al., 2020). For instance, daily work of any medical organization nowadays cannot be provided properly without a patient monitoring and controlling, clinical decision support, document automation, staff communication, interaction with insurance companies.

Electronic patient records and the ability to exchange health information electronically are also the crucial part of MIS, which allows providers better manage care for patients and provide better health care by: 1) providing accurate, up-to-date, and complete information about patients at the point of care; 2) enabling quick access to patient records for more coordinated, efficient care; 3) securely sharing electronic information with patients and other clinicians; 4) helping providers more effectively diagnose patients, reduce medical errors, and provide safer care; 5) improving patient and provider interaction and communication, as well as health care convenience; 6) enhancing privacy and security of patient data; 7) reducing costs through decreased paperwork, improved safety, reduced duplication of testing, and improved health ("What are the advantages of electronic health records? | HealthIT.gov," n.d.).

One of the key trends in the healthcare sector worldwide is telemedicine, which refers to the provision of remote clinical services, via real-time two-way communication between the patient and the healthcare provider, using electronic audio and visual means. The real role of telemedicine at present lies in the convenience it offers to patients and practitioners by obviating the necessity for a physical visit to get medical advice or treatment. It is also cost-effective in comparison to the process of waiting to see a doctor or other healthcare provider ("What is Telemedicine?," 2010).

Another vital system necessary for providing daily work of a medical organization is a Business Intelligence system (BI). It is a set of tools, applications, and techniques used to help organizations taking the right actions and decisions. The implementation of BI in health care industry has enabled data to be delivered beyond administrative offices and directly to clinical staffs who can make the most use of it. The use of BI in healthcare enables decision making process to become more effective where users can access any type of information with a fast and consistent response time. Healthcare enterprises use BI to build management dashboards that help in managing business processes and monitoring financial and clinical Key Performance Indicators (KPIs) (Khedr et al., 2017).

Medical equipment software is also an important part of MIS which aims to collect more information about each patient, and, as a result, will provide a personalized approach to each patient based on his individual characteristics (I. V. Ilin et al., 2020).

The given IT architecture should be provided by a technological layer which consists of servers and databases of considered systems.

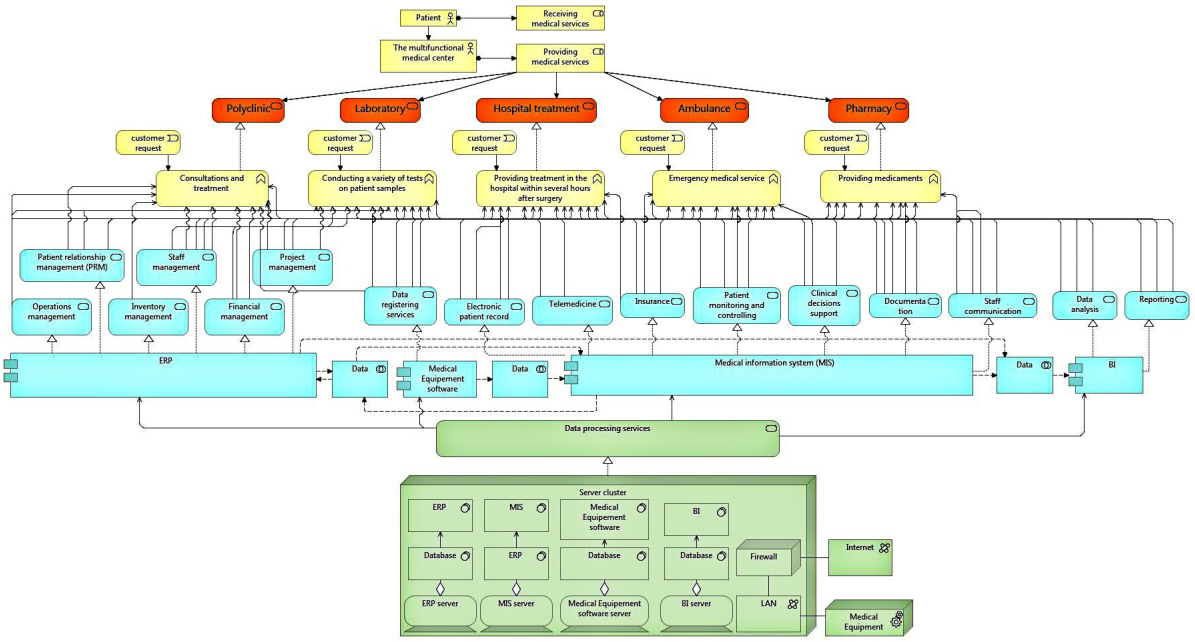


Fig. 4. AS IS model of the multifunctional medical center

2.2. Implementing SAP IBP cloud system in the multifunctional medical center

The process of implementing SAP IBP cloud system in the multifunctional medical center follows the scheme given on the figure 5 by (Kepczynski et al., 2018a). According to the authors, on the left side, there is the SAP Data Services Agent for SAP Cloud Platform Integration, which is installed behind the firewall of the customer's environment. The agent role is to provide secured connectivity and data transfer from on-premise sources (ERP, MIS, BI, medical equipment software) to the target in the cloud. The agent is able to operate without firewall exceptions, and the communication is always from the agent to the cloud which means that also when data is sent from IBP to on-premise, the agent will initiate the transfer. On the right side, there is the SAP Cloud Platform Integration for data services application, where the interfaces build and management takes place. Once the data has been extracted, transformed (if required), and mapped to the target, it gets loaded into IBP staging table. From here the IBP application starts the post processing activities to evaluate whether data is consistent or not. If yes, the data is moved to the core table and immediately available for access; if not, data is being rejected, and a rejection report can be retrieved from Data Integration Jobs app (Kepczynski et al., 2018a).

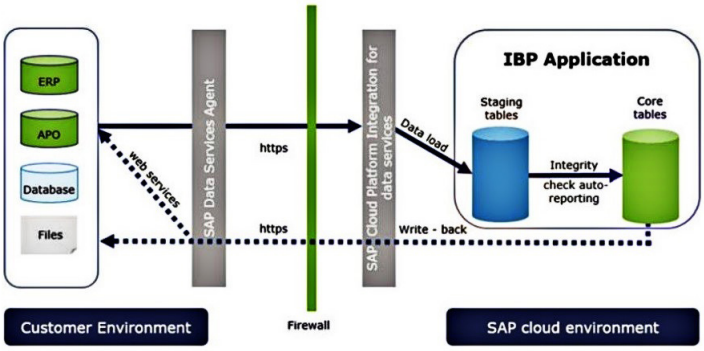


Fig. 5. Overview of integration with SAP IBP (Kepczynski et al., 2018a)

TO BE model of the multifunctional medical center with implemented SAP IBP cloud system is illustrated on the figure 6.

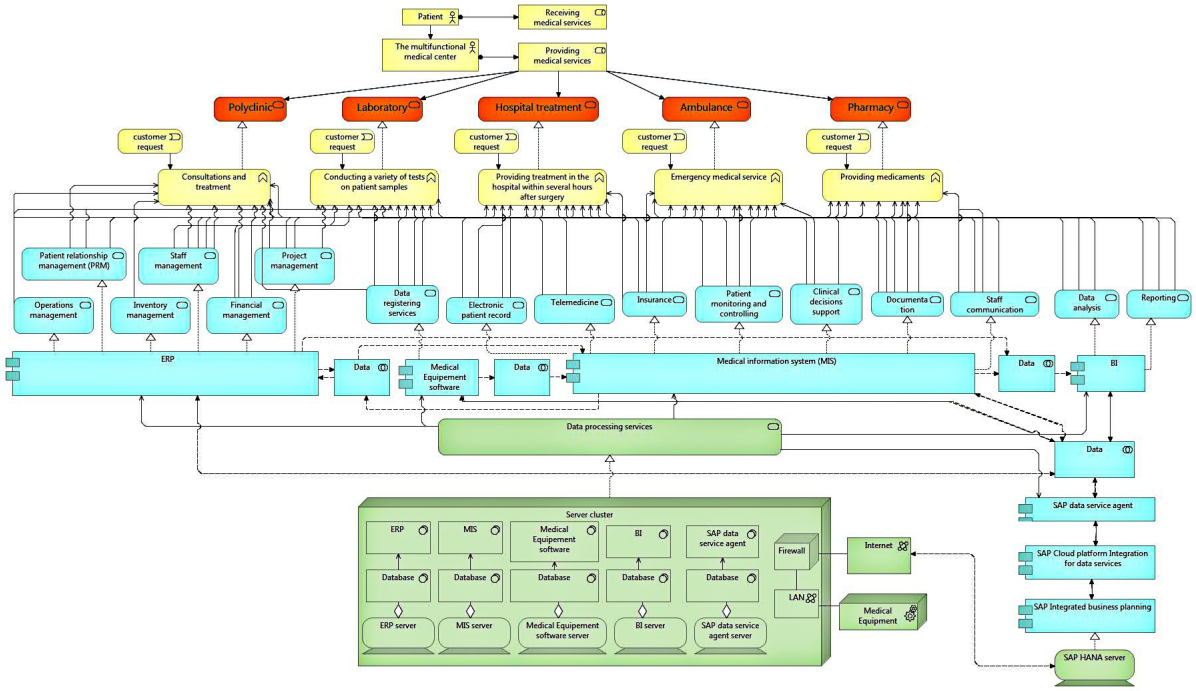


Fig. 6. TO BE model of the multifunctional medical center with implemented SAP IBP

Discussion

Implementing IBP concept in the medical institution is a new topic which requires further as theoretical, as practical research. The current studies in this field may be expanded and deepened by comparative research of IBP systems which are developed by different vendors, their advantages and disadvantages.

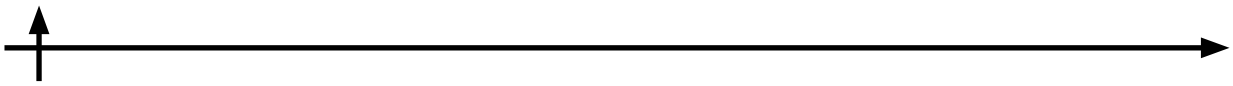
A detailed comparative analysis of ERP and IBP systems as the leading planning tools in modern companies can bring a positive impact on studying IBP concept. Theoretical research of the topic may be strengthened by case studies regarding implementing IBP system in the healthcare sector.

Conclusion

1. Digitalization of the healthcare sector is one of the fast-growing fields in terms of information technologies nowadays. This process was even accelerated by COVID-19 pandemic. Initially, first IT systems were implemented in the 1980s and in most of the 1990s (Stefanou and Revanoglou, 2006). Today this sector includes wide range of software: ERP, MIS, HIS, BI and other systems depending on the type and specialization of the medical institute.

2. One of the crucial domains in terms of implementing a new and efficient tool for improving the medical organization's daily work is inventory and supply chain management. In the case of hospitals, many materials are essential to keep the health quality or even the life of patients. Due to this fact, implementing IPB, for instance real-time SAP IPB cloud system, can be an efficient planning tool in the medical organization.

3. In the research paper the multifunctional medical organization's architecture was analyzed and built on TOGAF, The Open Group Architecture Framework, in terms of following key medical services for patients: polyclinic, laboratory, hospital treatment, ambulance and pharmacy. IT architecture of the considered medical center was based on the following systems: ERP (enterprise resource planning);



MIS (medical information system); Business intelligence system; Medical equipment software.

4. To successfully implement SAP IPB cloud system on the first stage it is necessary to install SAP Data Services Agent on the customer environment. The Agent is responsible for transferring data from on-premises sources (ERP, MIS, BI, medical equipment software) to the target in the cloud. On the cloud environment SAP IPB is supported by SAP HANA (High-performance Analytic Appliance) platform. It is a multi-model database that stores data in its memory instead of keeping it on a disk. This results in data processing that is magnitudes faster than that of disk-based data systems, allowing for advanced, real-time analytics (Gusev, n.d.). Due to this fact SAP IBP cloud system is a real-time planning solution which will allow the medical institutions to optimize inventory management and supply chain.

5. A comparative analysis of ERP and IBP systems, the case studies regarding implementing IBP system in the healthcare sector are defined as the keyways for further research in this field.

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INFORMATION ABOUT AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ

DOSPAN Saida O. – student.
E-mail: dospan88@mail.ru
ДОСПАН Саида Олеговна – студент.
E-mail: dospan88@mail.ru
ORCID: https://orcid.org/0000-0002-4130-6562

KHRYKOVA Anastasia A. – student.
E-mail: anastasiakhr@yahoo.com
ХРЫКОВА Анастасия Александровна – студент.
E-mail: anastasiakhr@yahoo.com
ORCID: https://orcid.org/0000-0002-9039-1345

ESSER Manfred – Founder & Chief Executive Officer, Prof. Dr. Ing.
E-mail: manfred.esser@myget-it.com
ЭССЕР Манфред – основатель и главный исполнительный директор, профессор, д.т.н.
E-mail: manfred.esser@myget-it.com
ORCID: https://orcid.org/0000-0001-8553-1334

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